



**NORTHCENTRAL UNIVERSITY
ASSIGNMENT COVER SHEET**

Student: **Michael Higley-Vance**

THIS FORM MUST BE COMPLETELY FILLED IN

Follow these procedures: If requested by your instructor, please include an assignment cover sheet. This will become the first page of your assignment. In addition, your assignment header should include your last name, first initial, course code, dash, and assignment number. This should be left justified, with the page number right justified. For example:

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Save a copy of your assignments: You may need to re-submit an assignment at your instructor's request. Make sure you save your files in accessible location.

Academic integrity: All work submitted in each course must be your own original work. This includes all assignments, exams, term papers, and other projects required by your instructor. Knowingly submitting another person's work as your own, without properly citing the source of the work, is considered plagiarism. This will result in an unsatisfactory grade for the work submitted or for the entire course. It may also result in academic dismissal from the University.

EDU7006-8

Dr. Rebecca Watts

Quantitative Research Design

Activity #1: The Logic of Experimental Design

Comments: Was able to start working on questions using the books I already had and the provided articles. Received my textbook just in time on Saturday to complete the assignment Sunday afternoon.

Faculty Use Only

~~<Faculty comments here>~~ Michael, thanks for submitting this assignment. I am glad that you received your textbooks. I want to provide you with a website that offers valuable information and graphics to help understand the concepts. I would bookmark this webpage as it will help with your understanding: <http://www.socialresearchmethods.net/kb/index.php>

I made a few comments in your paper. However, you answered the questions very thoroughly and correctly. I appreciate your writing the questions and answering in a different colored font. The study of quantitative design focuses on the threats to internal and external validity. You are correct in that internal validity is more important than external validity. If there is very little internal validity, then the external validity is somewhat of a moot point. However, there are times that external validity is quite important. One example is with medical research. We want to know that the results of studies will generalize to similar individuals prior to administering treatments to individuals. So, in essence, it is somewhat of a balancing act and one should ask themselves in the given context, which is more important...internal or external validity. Then the research should be designed to maximize internal validity and external validity as much as possible. I am providing you with a list of the threats to internal and external validity (some of the most important ones). Print out this list and keep it near your computer, as you will likely refer to it from time to time during the course. Please let me know if you have any questions.

Score = 100



Summary of Threats to
Internal Validity

<Faculty Name>

<Grade Earned>

<Writing Score>

<Date Graded>

The Logic of Experimental Design

- 1) Jackson (2012) even-numbered Chapter Exercises (p. 244). 2. You read in a health magazine about a study in which a new therapy technique for depression was examined. A group of depressed individuals volunteered to participate in the study, which lasted 9 months. There were 50 subjects at the beginning of the study and 29 at the end of the 9 months. The researchers claimed that of those who completed the program, 85% improved. What possible confounds can you identify in this study? There are several potential confounds present in this study to include: (a) a nonequivalent control group, (b) regression to the mean confound,

and (c) attrition confound. Confounds refer to flaws that can be found in an experiment (Jackson, 2012). Based on the information shared above, there does not seem to be an identified control group. A control group allows researchers to isolate influences to the independent variable, which allows them to dismiss alternative result explanations (Fan, 2010). Additionally, participants in this study volunteered and therefore, potentially seek to improve feelings of depression. Participants who desire to improve feelings of depression could indicate a regression to the mean (Jackson, 2012). Very good point. Finally, the researcher in this scenario describes an improvement of three-quarters in those who completed the program, however, over half of the participants left the study before the experiment ended. Therefore, an attrition confound in the study seems to be present (Jackson, 2012; Kovera, 2010). This is because the people who dropped out were all probably very similar with regard to their dispositions toward the program.

Question 4. What are internal validity and external validity, and why are they so important to researchers? According to Trochim and Donnelly (2008) validity is important because it is the “approximation to the truth of a given proposition, inference, or conclusion” (p. 22). Internal validity refers to causal relationships between variables (Trochim & Donnelly, 2008). Studies that lack internal validity cannot be attributed to the influences of the independent variable (Jackson, 2012). External validity is the extent to which the experiment can be applied to a larger population. According to Jackson (2012) using random sampling is one method of ensuring a study includes external validity (Jackson, 2012).

4) Question 6. What are the similarities and differences between within-subjects and matched-subjects designs? Within-subjects designs repeatedly take measures on the same group of participants, require fewer subjects, and take less time to conduct than between-subjects designs (Jackson, 2012). Additionally, within-subjects designs are used in all conditions and increase statistical data but are subject to weak internal validity (Jackson, 2012). Matched-subject designs contain subjects in different groups that share similar characteristics (Jackson, 2012). Within-subject and matched-subject designs are developed to accomplish the greatest degree of equivalence between groups. A matched-subject design requires a number of subjects more than within-subject designs (Jackson, 2012).

2) What is the purpose of conducting an experiment? The purpose of the experiment is to test a hypothesis or draw a scientific conclusion to an unanswered phenomenon or question. Experimentation is a necessary part of the scientific method (Trochim & Donnelly, 2008). Researchers use either a qualitative or quantitative research method to ask a question or form a hypothesis. Based on previous research, or prior knowledge of the phenomenon or question, an experimental design is performed to test that hypothesis. How does an experimental design accomplish its purpose? Experimental designs accomplish its purpose through multiple and rigorous experiments because a significant amount of data is collected. Researchers analyze the data derived from the experiment and draw a conclusion. According to Trochim and Donnelly (2008), if the experiment is implemented with fidelity then it probably poses a strong experimental design. One of the distinguishing attributes of experiments is that the researcher manipulates (controls) the independent variable. The research purposefully introduces or removed the independent variable (treatment).

- 3) What are the advantages and disadvantages of an experimental design in an educational study? A well-developed experimental design has strong internal validity and can establish a causal relationship between extraneous variables (Jackson, 2012; Trochim & Donnelly, 2008). An advantage of the experimental design is the control over external factors and variables. In an experimental study, the researcher can manipulate and control the variables, which increase the internal validity of the research experiment (Cresswell, 2009). Researchers who can control external factors and variables are able “to make a stronger claim to have determined causality” (Muijs, 2011, p. 19). One of the disadvantages of an experimental design is the correspondence to real-life situations. An experimental study applied to real-life problems is at a huge disadvantage because it is very difficult to recreate a controlled experiment in the classroom for instance. Additionally, there are an infinite number of variables and factors that could influence the experiment within the classroom and school environment. Another disadvantage could be the design itself, which randomly assigns subjects to control groups (Cresswell, 2009). Educational administrators, teachers, and parents are often wary of an experimental design because of ethical and possible learning deficiencies that can occur with one or more of the control groups (Muijs, 2011).
- 4) What is more important in an experimental study, designing the study in order to make strong internal validity claims or strong external validity claims? An experimental study, which has both types of validity are important. However, internal validity is the most important of experimental research. Experimental research requires internal validity because it is necessary for establishing a causal relationship (Jackson, 2012). Why? According to Ricker (n.d.) experimental studies, which incorporate strong internal validity are better than other studies at controlling the effects of external factors and variables. good answer

- 5) In an experiment, what is a control? Of single or multiple comparison groups? A control group identifies the participants of the study that did not receive the treatment (Trochim & Donnelly, 2008). Therefore, the control group is not subjected to the independent variable. What is the purpose of a control group? The control group provides a baseline. Studies that use an independent variable with more than two levels require multiple comparison groups (Jackson, 2012).
- 6) What are confounds? Give an example of a design that has three confounds. Describe three ways to alter the design to address these confounds and explain the advantages and disadvantages of each. Confounds are extraneous variables found in studies. Jackson (2012) defines three types of confounds. These confounds include (a) diffusion of treatment, (b) mortality or attrition, and (c) testing effect. If confounds are present, it is not possible to establish a causal relationship (Jackson, 2012). Diffusion of treatment results from possible changes in responses due to influences caused by other members of the study. One way to alter the design and minimize the possibility of diffusion is to test all participants simultaneously (Jackson, 2012). However, circumstances may make simultaneous testing impractical. Attrition results from participants who leave the study, which leads to variations within groups (Jackson, 2012). If attrition becomes too high, the research sample may become too small for statistical analysis. A way to overcome attrition is for researchers to monitor the study for loss variance. Finally, testing effect results from participants who respond to a particular test instrument numerous times. Therefore, members of the study become familiar with the test, which results in skewed data (Jackson, 2012). Implementing a control group, which has similar characteristics to the sample group may help minimize the testing effect.

- 7) What does “cause” mean and why is it an important concept in research? Cause is the phenomenon, which has a substantial influence on the effect (Wahed & Hsu, 2010). A casual relationship is established when the phenomenon is observed in a variety of settings (Wahed & Hsu, 2010). How are correlation and causation related? Correlation is an association that describes the relationship between two or more variables (Sheskin, 2010). A measure of correlation is descriptive and may not have a cause and effect relationship. In order to formulate a cause and effect relationship between two variables, a controlled experiment using test subjects that are randomly assigned to a control and test group must be established (Sheskin, 2010).
- 8) You are a researcher interested in addressing the question: does smiling cause mood to rise (i.e., become more positive)? Sketch between-participants, within-participants, and matched-participants designs that address this question and discuss the advantages and disadvantages of each to yielding data that help you answer the question. Describe and discuss each design in 4-5 sentences. **Between-subject design:** In this design model, there would be a random assignment to the test and control group. Both groups contain a large number of differentiated participants (Jackson, 2012). Pretests and posttests provide data that measures the participant’s mood. Smiling, which is the independent variable is only applied to the test group and mood, which is the dependent variable, is the identified measure. Potential confounds include attrition, instrumentation effect, diffusion of treatment, and subject effects. **Within-subject design:** In this design model, a random sample of participants is used and does not require a random assignment. This design requires fewer participants and all participants will serve under the control and test conditions. The data collected yields statistically powerful results due to fewer participants participating in multiple conditions,

which decreases individual differences between conditions, thereby reducing variability (Jackson, 2012). Within-subjects designs are subject to most identified confounds (Jackson, 2012). **Matched-subject design:** Match-subjects designs share similar characteristics with both between and within-subjects designs (Jackson, 2012). According to Jackson (2012), this design type uses different participants and assigns participants at random to each group condition. The characteristic of each group is to have matching participants with equivalent characteristics (age, weight, sex, or mood). A matched-subject design helps to minimize carryover effect (Jackson, 2012). This design is statistically powerful because individual differences among groups are minimized; however, additional participants will be needed.

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